60th Medical Group (AMC), Travis AFB, CA

INSTITUTIONAL ANIMAL CARE AND USE COMMITTEE (IACUC)

FINAL REPORT SUMMARY

(Please type all information. Use additional pages if necessary.)

PROTOCOL #: FDG20150033A **DATE:** 12 Oct 2016

PROTOCOL TITLE: A Pilot Study of Peritoneal Perfusion with a Novel Hemoglobin Based Oxygen Carrier in Swine (*Sus scrofa*).

PRINCIPAL INVESTIGATOR (PI) / TRAINING COORDINATOR (TC): Maj Ian Stewart

DEPARTMENT: SGSE **PHONE #:** 423-7264

INITIAL APPROVAL DATE: 28 September 15 **LAST TRIENNIAL REVISION DATE:** N/A

FUNDING SOURCE:

1. **RECORD OF ANIMAL USAGE:**

Animal Species:	Total # Approved	# Used this FY	Total # Used to Date
Sus scrofa	14	0	14

2. **PROTOCOL TYPE / CHARACTERISTICS:** (Check all applicable terms in **EACH** column)

___ Training: Live Animal	___ Medical Readiness	___ Prolonged Restraint
___ Training: non-Live Animal	___ Health Promotion	___ Multiple Survival Surgery
___ Research: Survival (chronic)	___ Prevention	___ Behavioral Study
_X_ Research: non-Survival (acute)	___ Utilization Mgt.	___ Adjuvant Use
___ Other ( )	___ Other (Treatment)	___ Biohazard

3. **PROTOCOL PAIN CATEGORY (USDA):** (Check applicable) ___ C _X_ D ___ E

4. **PROTOCOL STATUS:**

***Request Protocol Closure:**

___ Inactive, protocol never initiated

___ Inactive, protocol initiated but has not/will not be completed

_X_ Completed, all approved procedures/animal uses have been completed

5. **Previous Amendments:**
List all amendments made to the protocol. **IF none occurred, state NONE. Do not use N/A.**

For the Entire Study Chronologically

Amendment Number	Date of Approval	Summary of the Change
1	19 Nov 15	Personnel, procedures
2	10 Mar 16	Procedures

6. **FUNDING STATUS:** Funding allocated: $17,785 Funds remaining: $ 0

7. **PROTOCOL PERSONNEL CHANGES:**

Have there been any personnel/staffing changes (PI/CI/AI/TC/Instructor) since the last IACUC approval of protocol, or annual review? _X__ Yes ___ No

If yes, complete the following sections (Additions/Deletions). For additions, indicate whether or not the IACUC has approved this addition.

ADDITIONS: (Include Name, Protocol function - PI/CI/AI/TC/Instructor, IACUC approval - Yes/No)

Hilary Loge (AI)- Yes, Lucas Neff (AI)- Yes, Rachel Russo (AI)- Yes

DELETIONS: (Include Name, Protocol function - PI/CI/AI/TC/Instructor, Effective date of deletion)

None

8. **PROBLEMS / ADVERSE EVENTS:** Identify any problems or adverse events that have affected study progress. Itemize adverse events that have led to unanticipated animal illness, distress, injury, or death; and indicate whether or not these events were reported to the IACUC.

None

9. **REDUCTION, REFINEMENT, OR REPLACEMENT OF ANIMAL USE:**

REPLACEMENT (ALTERNATIVES): Since the last IACUC approval, have alternatives to animal use become available that could be substituted in this protocol without adversely affecting study or training objectives?

No

REFINEMENT: Since the last IACUC approval, have any study refinements been implemented to reduce the degree of pain or distress experienced by study animals, or have animals of lower phylogenetic status or sentience been identified as potential study/training models in this protocol?

No

REDUCTION: Since the last IACUC approval, have any methods been identified to reduce the number of live animals used in this protocol?

No

10. **PUBLICATIONS / PRESENTATIONS:** (List any scientific publications and/or presentations that have resulted from this protocol. Include pending/scheduled publications or presentations).

None

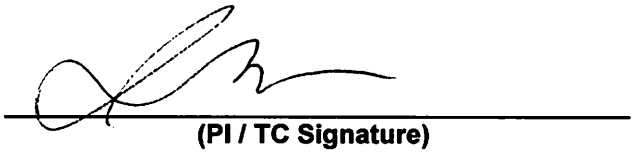
11. **Were the protocol objectives met, and how will the outcome or training benefit the DoD/USAF?**

Yes, the protocol objectives were met. We did not find that this method of peritoneal lung replacement to be effective with this model. Future work may be done to optimize the method or attempt less severe injury.

12. **PROTOCOL OUTCOME SUMMARY:** (Please provide, in "ABSTRACT" format, a summary of the protocol objectives, materials and methods, results - include tables/figures, and conclusions/applications.)

Extracorporeal membrane oxygenation (ECMO) has been used to treat the most severe cases of acute respiratory distress syndrome. However, this method has a high rate of complications, obliges systemic anticoagulation, and requires a significant level of logistics support as well as expertise. In light of these limitations, ECMO may not be an option in future conflicts with projected delayed evacuation times. We propose the concept of using the peritoneum for gas exchange and lung replacement. Fourteen Yorkshire-cross swine were used for this study. The first 4 animals were used to develop the appropriate tubing and tubing placement to facilitate large volume flows within the peritoneal space. Once the technique was perfected, 10 animals were anesthetized, mechanically ventilated, instrumented, and laparotomized. Inflow and outflow tubing were placed in the abdomen, and

connected to a heart-lung bypass circuit, and the abdomen closed. Animals were then randomized to peritoneal perfusion with either a novel bovine hemoglobin-based oxygen carrier or control (Lactated Ringers). After flow was established, the endotracheal tube was clamped, ceasing gas exchange in the lung. Arterial blood gases and time to death were then recorded. No differences were observed between treatment and control animals in terms of CO2, O2 and time to death. Peritoneal gas exchange did not improve oxygenation, ventilation or time to death in this severe model of lung injury. Possible reasons for this include 1) insufficient mass transfer of oxygen to the peritoneal space or 2) insufficient blood supply to peritoneal space to allow for systemic absorption.



(PI / TC Signature)

3 Jan 17

(Date)

Attachments:
Attachment 1: Defense Technical Information Center (DTIC) Abstract Submission

Attachment 1
Defense Technical Information Center (DTIC) Abstract Submission

Objectives: Extracorporeal membrane oxygenation (ECMO) has been used to treat the most severe cases of acute respiratory distress syndrome. However, this method has a high rate of complications, obliges systemic anticoagulation, and requires a significant level of logistics support as well as expertise. In light of these limitations, ECMO may not be an option in future conflicts with projected delayed evacuation times. We propose the concept of using the peritoneum for gas exchange and lung replacement.

Methods: Ten Yorkshire-cross swine were anesthetized, mechanically ventilated, instrumented, and laparotomized. Inflow and outflow tubing were be placed in the abdomen, and connected to a heart-lung bypass circuit, and the abdomen closed. Animals were then randomized to peritoneal perfusion with either a novel bovine hemoglobin-based oxygen carrier or control (Lactated Ringers). After flow was established, the endotracheal tube was clamped, ceasing gas exchange in the lung. Arterial blood gases and time to death were then recorded.

Results: No differences were observed between treatment and control animals in terms of CO2, O2 and time to death.

Conclusion: Peritoneal gas exchange did not improve oxygenation, ventilation or time to death in this severe model of lung injury.

Grant Number: N/A
From:
****If you utilized an external grant, please provide Grant # and where the grant came from. Thank you.**